"IT IS NEVER TOO LATE!".

Fertilization

(site - process - results)

site: in the lateral part of uterine tube.

process: The sperms cannot fertilize the ovum unless they undergo 2 processes:

1- Capacitation

A glycoprotein and seminal plasma proteins are removed from the membrane that covers the acrosome of a sperm.

2- Acrosome reaction:-

The sperms release acrozomal enzymes which dissolves the zona pellucida.

3- only one sperm penetrates the vitelline membrane of the ovum by its head and neck and its body and tail are detached outside the ovium.

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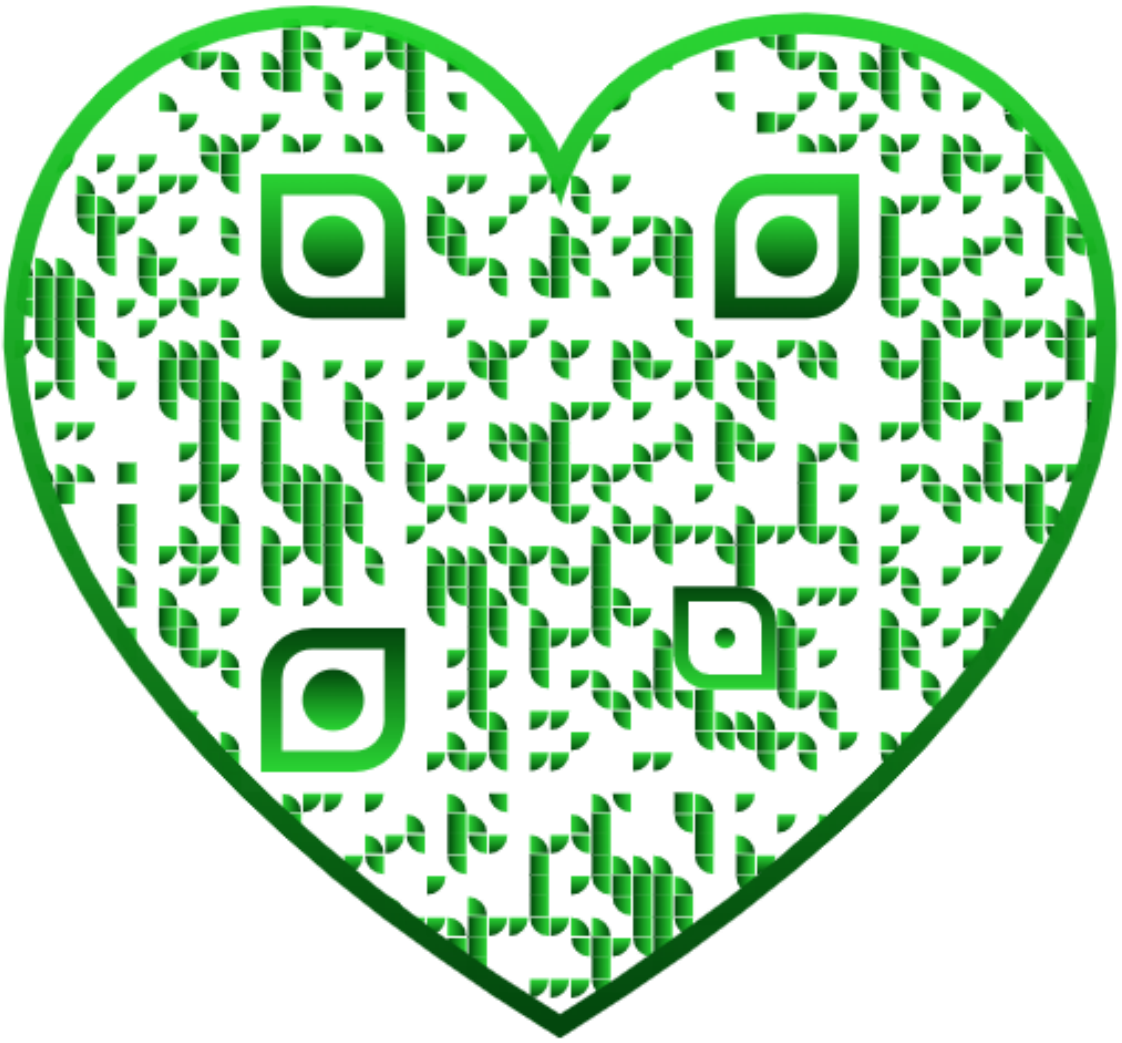

4- The zona pellucida change its character and prevent any further penetration of other sperms

5- The head of the sperm swells to form the male pronucleus and the anterior centriole of the neck of the sperm form 2 centrioles

6- The nucleus of the ovum swells to form the female pronucleus.

7- The male and female pronuclei fuse together to form the zygote.

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Results

1- The zygote restores the normal chromosomal number (46)

2- Determination of sex

If the sperm contains 22 x and unites with ovum, it ~~form~~ gives (44 xx female) and if it contains 22 y, it gives 44 x y male

3- The zygote is activated to start cell division.

4- Inheritance of many characters from the chromosomes of mother and father

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Placenta (Definition - function - congenital anomalies)

Definition is a large organ that develops during pregnancy from foetal part (chorion frondosum) which is the main part and maternal part (decidua basalis) and it becomes mature at the 5th month of pregnancy.

functions

1- respiration
2- nutrition
3- ~~Excret~~ Excretion
4- Immunization
   a) antibodies against some diseases can pass from maternal blood to foetal blood through placenta
   b) The placenta prevents the transmission of some diseases from the mother to foetus

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5- Hormonal production

a- oestrogen

→ Stimulates the growth of uterus and decidua, and the development of breast

→ Induces uterine contraction in labour.

b- progesterone

→ growth of decidua

C- Relaxin

→ softens the ligaments of pelvis which facilitates delivery

d- chorionic gonadotrophins

" thyrotrophins

" adreno-cortico trophins

e- placental lactogen and prolactin

6- Metabolism

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Anomalies of the placenta

1 - Abnormal position of placenta (placenta previa)

1 - placenta previa lateralis

2 - placenta previa centralis

3 - " " marginalis

2 - Anomalies of attachement of umbilical cord

1 - Battledore placenta

→ the umbilical cord is attached to the peripheral part of placenta

2 - Velamentous insertion of the cord which is attached to the amniotic membrane away from the placenta

3 - Eccentric attachment of the cord to the placenta.

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3- Anomalies in number

1- Bilobed placenta

2- Trilobed placenta

3- placenta succenturiata

with an accessory piece of placenta

4- placenta membranes or diffuse placenta (Large)

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Umbilical cord (Definition- function- congenital anomalies)

Definition: It's the elongated connecting stalk.

Functions

It transmits umbilical vessels which carry nutritive substances and oxygen from placenta to foetus and waste products and CO_2 from the foetus to placenta.

Congenital anomalies

1- Very long umbilical cord.
2- " short " "
3- Abnormal attachment to the placenta (eccentric marginal or velmatous)
4- umbilical hernia
5- Double umbilical cords
6- presence of 1 umbilical a.
7- presence of knots

190103:
a) True b) False

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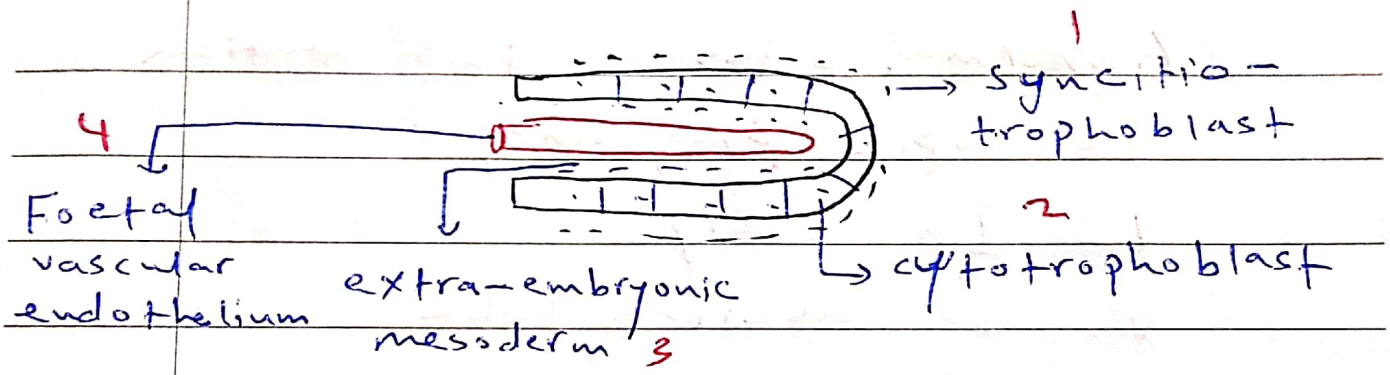
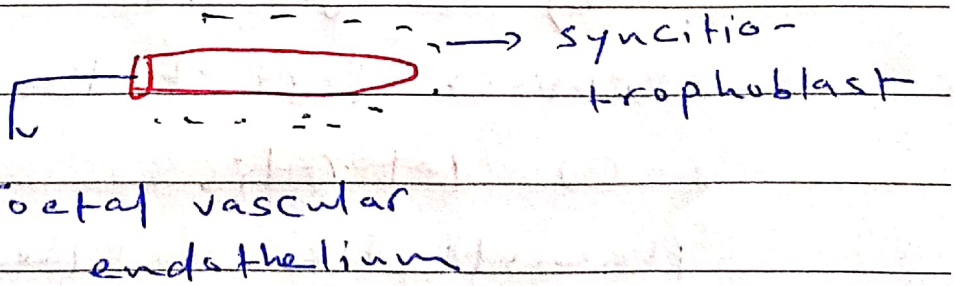
placental membrane (placental barrier)

The foetal and maternal blood are separated from each other by placental membrane which is formed of:



At the 4th month, the placental membrane becomes ~~thin~~ and consists of 2 layers:-



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Implantation (Normal site - abnormal site)

Normal site :-

In the middle part of endometrium of the posterior wall of uterus near the fundus.

Abnormal sites of implantation (ectopic pregnancy)

1- In ovary
2- In uterine tube
3- In peritoneal cavity
4 - placenta previa :-

a) centralis →
→ covers the internal os completely

b) marginalis
→ covers part of the internal os

c) lateralis
Placenta lies in the lower part of uterus

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Lateral plate of mesoderm (site - Derivatives, intra-embryonic coelom)

Site: (the lateral part of mesoderm) → Lateral to the longitudinal groove.. on each side of notochord.

Derivatives

1- somatic layer that gives rise to:

1- muscles of the abdominal and chest wall.

2- parietal layer of peritoneum and pleura

2- splanchnic (visceral) layer

1- muscles of the heart, bronchial tree and gut.

2- visceral layer of pericardium, pleura and peritoneum.

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The Intra-Embryonic coelom

It is U-shaped cavity inside the lateral plate of mesoderm.

It forms

1- Future pericardial cavity
2- Future peritoneal cavity
3- Future pleural cavity

para-axial mesoderm

the medial part that lies parallel to the notochord.

By the 3rd week, it's divided by several transverse grooves into 42-44 somites or metamere on each side of the notochord.

The somites are classified into

1- occipital (4-5) they form the skull
2- cervical 7

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3- Thoracic 12

4- lumbar 5 in number

5- sacral 5

6- coccygeal 5-10

At the begining, each somite contains a cavity called myocele which is later occluded by cells from its wall

The cells of ventromedial portion of somite form the scleretome which surrounds the notochord and they give axial skeleton

The cells of dorsilateral portion form dermomytome which splits into:

1) myotome or muscle plate

2) dermatome or skin plate.

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Umbilical cord (Development ; structure)

Development :-

It's the elongated connecting stalk. It's formed after folding during the 5th week as a result of enlargement of amniotic cavity. It's attached to the anterior abdominal wall of foetus and to the center of foetal surface of placenta

It becomes mature at full term where its length is about 50 cm and its diameter is about 1.25 cm.

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Structure

1- A tubular covering of amniotic membrane

2- The extra-embryonic mesoderm of connecting stalk which becomes jelly-like loose mesoderm known as wharton's jelly.

3- Allantois: it's oblitrated except its intra-embryonic (proximal part) which form the urachus of urinary bladder

4- The umbilical vessels (2 arteries and one vein). (At first they were 2 veins, right and left, the right vein deganerate early and the left vein persists)

5- The remains of vitello-intestinal duct which disappears at about the 3rd month.

6- The remains of extra-embryonic coelom which disappear later on.

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placenta (gross anatomy)

1- It is a discoid mass with a circular or oval outline.

2- Its average volume is 500 ml

3- " " weight is 500 gm

5- " " diameter is 18.5 cm

6- " " thickness is 2.5 cm at the center and rapidly diminishes in thickness towards its periphrey.

6- it has 2 surfaces:

a) Foetal surface (inner surface)

→ it's smooth, shiny, transparent and covery by amnion

→ The umbilical cord usually attached near the center and branches of umbilical vessels radiate out the amnion.

b) Maternal surface (outer)

it's granular and consists about (15-30) lobes by series of grooves these lobe are known as cotyledons

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Twins

A) Monozygotic (identical twin)

1- one ovum is fertilized by a single sperm

2- The embryonic cells separate into 2 parts at any stage up to the formation of the axis of embryonic plate.

3- Each of the 2 parts gives rise to a complete embryo.

4- The twins have the same sex, blood groups and same genetic structure.

5- They may have a single or two amniotic sacs or chrionic sacs

6- They are exactly similar except for their fingerprints.

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B) Diazygotic (binovular twins)

1- Two ova are discharged and fertilized by two different sperms.

2- Each embryo has its own chrionic sac, rarely the 2 sac fuse

3- The twins may be of the same or different sex.

4- They have different genetic structure.

congenital anamolies of fertilization :-

1- Mongolism :-

There's extra-chromosome. The total number is 47. The mongol has mongloid eyes, mental retardation and usually dies at puberty.

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2- Turner syndrome

There's defect in chromosomal part (45), there's a single X chromosome. It affects females which are sterile and has imperfect feminine characters.

3- Klinfelter's syndrome:-

The chromosomal # number is increased 47; 44XXy, it affects the males with small abnormal testes and enlarged breast.

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UTERINE CYCLE:-

Definition:- rhythmic changes which occur every month in the endometrium of the uterine.

phases of uterine cycle:-

a) Menstrual phase (3 → 5 days)

The superficial part of endometrium is shed in the form of interrupted bleeding from vagina.

b) Follicular phase 5 → 15th day

The endometrium starts a process of repair under the influence of oestrogen hormone secretted by graffian follicle. as follows

1- The epithelium grows to cover the eroded areas.

2- The uterine glands are straight and narrow then they become tortuous and rich with secretion containing mucin and glycogen

3- The endometrium becomes well vascularized and increase in

The lutcal phase:-

The endometrium increases in thickness duo to

1- increase the thickness of its mucous membrane

2- The uteringe glands enlarge and become tortuous

3- increase endometrium vascularity and interestitial fluids ~~to~~ make the endometrium soft and velvet in color

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The embryonic plate

1- It's at first rounded and then it becomes oval and lastly it becomes pear-shaped.

2- Early in development; It consists of 2 layers only:

1- Ectoderm (dorsal)

2- Endoderm (ventral)

The yolk sac lies ventral to the endoderm and amniotic cavity lies above and dorsal to ectoderm

3- The following changes take place in the embryonic place

1- The prochordal plate

The cuboidal endodermal cells near the future anterior end of embryonic plate become columnar and form prochordal plate

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2- The primitive streak:
rapid multiplication of ectodermal cells at the posterior end of embryonic plate, form a linear opacity known as primitive streak.

3- The primitive node:-
is a localized node of rapid ectodermal cells growth, it appears as a small swelling at the anterior end of primitive streak.

4- The notochordal process
It's a rod like structure of actively dividing ectodermal cells from the primitive node. It extends between ectoderm and endoderm

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5- The notochordal canal :-

The notochordal process acquires a central canal which opens posteriorly at the primitive node in an opening called the blastopare.

6- neuroentric canal :-

some of the endordermal cells and some of the cells of noto-chordal process disappear at the floor of the notochordal canal. Thus, a temporary connection between amniotic cavity and yolk sac is formed which is known as the neuro-enteric canal.

7- The notochord :- the floor of neuro-entric canal is repaired by growing of endodermal cells and the notochorday process and its canal becomes occluded and now is known as notochord.

1900103 :-
The notochord forms the basis of formation of vertebral column.

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Yolk sac: One of the foetal membranes that develops from zygote and does not share in formation of embryo.

Stages:

1. Primary yolk sac:
Formed during blastocyst stage when the extra-embryonic mesoderm arises from endoderm and extends to line the trophoblast.

2. Secondary yolk sac:
developed during chrionic vesicular stage. when the 1ry yolk sac becomes smaller in size.

3- After folding:
part of yolk sac is enclosed inside the embryo forming foregut, midgut and hindgut and the part of yolk sac that remains outside the embryo is called "Definitive yolk sac" and is connected to midgut by "vitellointestinal duct"

Amnion (Definition - functions anomalies)

Def: the feotal membrane that completely surrounds the embryo after folding and also surrounds the umbilical cord and loosely covers placent and rest of embryo. Chorion.

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... embryonic mesoderm.

functions

1- it protects the foetus from the effect of pressure and tramma.

2- It allows foetal movement which is important to the development of its muscles

3- It provides equal pressure on foetus which is important to symmetrical development.

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3- It maintains a constant temperature around the foetus

4- It prevents adhesions between different part of foetus

6- It helps the cervis of the uterius to dilate at labour.

7- At birth, when amniotic sac ruptures, the amniotic fluid passes down and washes the vagina so it acts as a natural anti-septic to vagina before ~~delv~~ delivery of foetus

Anomalies of amnion:-

1- oligohydroamnios ; the amniotic fluid is less than ~~half~~ a liter

2- Poly hydro amnios ; the amniotic fluids is more than 2 liters

3 - if the amniotic sac does not ruptures during labour the foetus will be born inside

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